



**OFFICE OF THE DIRECTOR  
DEFENSE RESEARCH AND ENGINEERING  
3040 DEFENSE PENTAGON  
WASHINGTON, D.C. 20301-3040**

June 28, 2002

MEMORANDUM FOR High Performance Computing Advisory Panel

SUBJECT: Selection of FY 2003 Department of Defense (DoD) High Performance Computing (HPC) Challenge Projects

I am pleased to announce the selection of FY 2003 DoD High Performance Computing (HPC) Challenge Projects. These projects address the Department's highest priority needs in science and technology, and test and evaluation, and will take advantage of extensive new HPC capabilities at our major shared resource centers and distributed centers.

Based upon the recommendation of the Challenge Project Review Board, I approve the continuation of all 28 previously selected multi-year Challenge Projects (listed in attachment 1) and 11 new Challenge projects (listed in attachment 2). The new projects were selected from the 24 proposals submitted by your components in response to the annual call for Challenge Project proposals.

The 39 FY 2003 Challenge Projects have all been subjected to extensive peer review resulting in top evaluations. The High Performance Computing Modernization Office (HPCMO) will soon be providing you with the computational time allocated for each Challenge Project to be implemented on 1 October 2002. Once again, the HPCMO will evaluate the progress being made on each on-going Challenge Project and incorporate the results of this evaluation into the FY 2004 selection process.

Congratulations to your participating organizations on proposing successful DoD Challenge Projects. I expect that the results of these efforts will provide critically important and highly visible examples of how high performance computing produces military advantage for the warfighter. My point-of-contact for this activity is the HPCMP Deputy Director, Larry Davis, at (703) 812-8205, e-mail address [larryd@hpcmo.hpc.mil](mailto:larryd@hpcmo.hpc.mil).

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Cray J. Henry  
Director, High Performance Computing  
Modernization Program

Attachments:  
As stated

Attachment 1  
Continuing DoD Challenge Projects in FY 2003

1. Directed High Power RF Energy: Foundation of Next Generation Air Force Weapons – Air Force Research Laboratory – Keith Cartwright
2. Applied Computational Fluid Dynamics (ACFD) in Support of Aircraft-Store Compatibility and Weapons Integration – Air Force SEEK EAGLE Office – John Martel
3. New Materials Design – Air Force Office of Scientific Research – Jerry Boatz
4. Characterization of DoD Relevant Materials and Interfaces - Air Force Office of Scientific Research – Emily Carter
5. Submerged Wakes in Littoral Regions – Office of Naval Research – Patrick Purtell
6. Large-Eddy Simulation of Steep Breaking Walls and Thin Spray Sheets Around a Ship: The Last Frontier in Computational Ship Hydrodynamics – Office of Naval Research – Dick K.P. Yue
7. Coupled Mesoscale Modeling of the Atmosphere and Ocean – Naval Research Laboratory – Richard Hodur
8. Multi-Scale Simulations of High Temperature Ceramic Materials – Air Force Office of Scientific Research – Rajiv Kalia
9. Active Control of Fuel Injectors in Full Scale Gas Turbine Engines – Army Research Office – Suresh Menon
10. Multiphase CFD Simulations of Solid Propellant Combustion in Modular Charges and Electrothermal-Chemical (ETC) Guns – Army Research Laboratory – Michael Nusca
11. Time-Accurate Computational Simulations of Ship Airwake for DI, Simulation and Design Applications – Naval Air Warfare Center Aircraft Division – Susan Polsky
12. Airdrop System Modeling for the 21st Century Airborne Warrior – U.S. Army Soldier & Biological Chemical Command – Richard Benney
13. 1/32 Degree Global Ocean Modeling and Prediction – Naval Research Laboratory – Alan Wallcraft
14. Airborne Laser Project II – Air Force Research Laboratory – Wilbur Brown

15. Unsteady RANS Simulations for Surface Ship Maneuvering and Seakeeping – Naval Surface Warfare Center – Ki-Han Kim
16. Three-Dimensional, Unsteady, Multi-Phase CFD Analysis of Maneuvering High Speed Supercavitating Vehicles – Office of Naval Research – Robert Kunz
17. Signature Modeling for Future Combat Systems – Army Research Laboratory and Army Tank-Automotive Research Development and Engineering Center – Raju Namburu and Theresa Gonda
18. High Fidelity Analysis of UAVs Using Nonlinear Fluid/Structure Simulation – Air Force Research Laboratory – Reid Melville, and Miguel Visbal
19. High-Fidelity Simulation of Littoral Environments – Naval Research Laboratory – Richard Allard and Jeffrey Holland
20. Seismic Signature Simulations for Tactical Ground Sensor Systems and Underground Facilities – US Army Corps of Engineers, Engineer Research and Development Center – Mark Moran
21. Multiscale Simulations of Nanotubes and Quantum Structures – Office of Naval Research – Jerry Bernholc
22. Multi-Scale Simulations of High Energy Density Materials – Air Force Research Laboratory – Jerry Boatz
23. Basin-scale Prediction with the HYbrid Coordinate Ocean Model – Office of Naval Research – Eric Chassignet
24. Time Accurate Aerodynamics Modeling of Synthetic Jets for Projectile Control – Army Research Laboratory – Jabaraj Sahu
25. Computational Chemistry Models Leading to Mitigation of Gun Tube Erosion – Army Research Laboratory – Cary Chabalowski
26. Large-Eddy Simulation of Tip-Clearance Flow in a Stator-Rotor Combination – Office of Naval Research – Parviz Moin
27. Evaluation and Retrofit for Blast Protection in Urban Terrain – US Army Corps of Engineers, Engineer Research and Development Center – James Baylot
28. First Principles Studies of Technologically Important Smart Materials – Office of Naval Research – Andrew Rappe

**Attachment 2**  
**New DoD Challenge Projects for FY 2003**

1. Three-Dimensional Modeling and Simulation of Weapons Effects for Obstacle Clearance – Naval Surface Warfare Center, Indian Head Division – Alexandra Landsberg
2. Towards Predicting Scenarios of Environment Arctic Change (TOPSEARCH) – Naval Post Graduate School – Wieslaw Maslowski
3. Numerical Modeling of Turbulent Wakes for Naval Applications – Office of Naval Research – Michael Gourlay
4. Modeling Complex Projectiles-Target Interactions II – Army Research Laboratory – Kent Kimsey and David Kleponis
5. Three-Dimensional CFD Modeling of the Chemical Oxygen-Iodine Laser II – Air Force Research Laboratory, Directed Energy Directorate – Timothy Madden
6. Time Accurate Unsteady Simulation of the Stall Inception Process in the Compression System of a US Army Helicopter Gas Turbine Engine – Army Research Laboratory – Michael Hathaway
7. Multidisciplinary Applications of Detached-Eddy Simulations of Separated Flows at High Reynolds Numbers – US Air Force Academy – James Forsythe
8. Computational Support for Chemically Reactive Flows and Non-ideal Explosives – Defense Threat Reduction Agency – Joseph Crepeau
9. Stochastic Simulations of Flow-Structure Interactions – Office of Naval Research – George Em Karniadakis
10. Defense Against Chemical Warfare Agents (CWAs) and Toxic Industrial Chemicals (TICs): Filtration, Prophylaxis and Therapeutics – Army Research Laboratory – Margaret Hurley, Jeffrey Wright and Alex Bolboa
11. Simulation of Coherent Radar Backscatter from Dynamic Sea Surfaces – Naval Research Laboratory – Mark Sletten